Innovating industrialization and vocational training in the Suape Port Complex, Brazil

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Sem ter a formação do economista, nem a vivência do pesquisador, ouso aqui chamar a atenção dos leitores desta página para outra grande mudança de cenário nas terras do Complexo de Suape: entram a refinaaria e os estaleiros, saem a fome, a mortalidade infantil e os homens-gabirus.

Conformado com os prejuízos ao meu paladar pela perda das deliciosas, coloridas e variadas frutas que vinham das reservas naturais de Suape, ameaçadas pela Refinaria, Estaleiros e demais investimentos estruturadores, me julgo consistentemente em constatar que outros produtos estão sendo também erradicados para dar lugar aos investimentos industriais. E quem me disse isso foi nada mais nada menos que o presidente Lula, quando de sua recente visita ao Estado para presenciar o batimento de quilha do primeiro navio em fabricação no Estaleiro Atlântico Sul.

Ao passar no meio dos milhares, de fato, milhares, de operários do Estaleiro, todos fardados, com botas, capacetes, óculos de soldador e outros equipamentos de proteção individual, o presidente fez e em seguida anunciou no pano de fundo, os resultados de uma pesquisa informal que ele aplicou com os operários: são de aqui da região? O que fazem seus pais? Você tem carteira assinada? Recebe seus direitos trabalhistas de férias, décimo-terceiro? As respostas foram as mesmas, e me tiraram da boca o gosto saudoso dos cajus e das mangabas, embora me desse vontade de tomar uma lapada de cachaça: eram todos aqueles jovens operários possuidores de carteiras de trabalho assinadas, alfabetizados e com cursos profissionalizantes, e filhos de plantadores de cana na região, pais hoje aliviados por não terem seus filhos de facão na palha da cana.

Roberto Rêgo, Civil Engineer
Op-Ed. Diário de Pernambuco. 11/22/2009

Without having the training of the economists or the lifestyle of the researchers, I here dare to call the attention of those who are reading this page to another great change occurring in the lands of the Suape Complex: once the refinery and the shipyards enter, hunger, infant mortality and desperation leave.

Consistent with the prejudices of my palate over the loss of the delicious, colorful and varied fruits that came from the natural reserves of Suape and are threatened by the Refinery, Shipyards and other structural investments, I consider myself worthy to testify that other characteristics of the region are also being eradicated in order to make room for these industrial investments. And the one who told me this was none other than President Lula while he was on a recent visit to Pernambuco in order to attend the commissioning of the first ship that was built in the South Atlantic Shipyard.

Passing through the thousands – indeed, thousands – of employees of the Shipyard, all uniformed and wearing boots, helmets, welding goggles and other safety equipment, the president came up and immediately announced from the stage the results of an informal study that he carried out with the employees: Are you from this region? What do your parents do? Do you have a social security card? Do you enjoy the right to holidays and an annual bonus? The results were all the same, and they took from my mouth any nostalgia for the tastes of those cashews and tropical fruits, although they did make me feel like taking a swig of cachaça: the young people were all employees in possession of social security cards, literate and with professional training, and they were all children of sugarcane planters in the region who are today relieved to not have their children working with machetes among the sugarcanes.
TABLE OF CONTENTS

1. Introduction 4
2. Literature Review 10
3. Context 15
4. Training a local workforce at South America’s largest shipyard 21
5. Preparing a workforce from scratch 25
6. Embedding international recruitment within on-the-job training 35
7. Conclusions 44
8. References 54
Chapter I: Introduction

In spite of the effects of the Great Recession on the global economy, Brazil has enjoyed relatively stable growth of 4.4% per year on average since 2006 (IPEA) while at the same time making great strides in reducing inequality. Several commentators, however, have noted that the country’s ability to continue to meet economic development goals is becoming threatened by the fact that many Brazilian firms, particularly those in capital-intensive and export-oriented sectors, are unable to identify domestic sources of skilled labor (Downie 2008, Marcelino 2009, Máximo 2010, Oscar 2010). This skills shortage, in fact, could become a bottleneck for future economic growth (Pompermayer et al 2011). Much of the unsatisfied labor demand in these industries is tied to massive public and private investments tied to the recently discovered Pre-Salt offshore oil deposit and the infrastructure requirements of the upcoming World Cup and Olympic Games. The national government has recognized the significance of these skills shortages and has targeted education and training systems for development as part of the Programa de Aceleração de Crecimento (PAC; English: Growth Acceleration Plan). Actually implementing these workforce development plans, of course, is easier said than done. Given the competitive pressures facing firms to keep costs low and to avoid the poaching of trained workers, it becomes very difficult to induce private actors to invest in the vocational training institutions. Indeed, establishing firm-based and -funded vocational training institutions is extremely difficult and requires a delicate balance of economic, social and political factors (Thelen 2004). Understanding the conditions that favor private investments in vocational training, then, should be of great interest to planners and policy makers in both less developed and economically advanced countries. This paper will contribute to the debate by demonstrating the conditions under which Estaleiro Atlântico Sul (EAS; English: South Atlantic Shipyard), a large shipyard in Pernambuco State in the Northeast of Brazil, and regional public and non-profit actors overcame barriers to training in order to break through labor market bottlenecks in
particular occupations. This case is especially striking given that EAS managed to achieve an impressive speed to production in spite of the firm’s commitment to local hiring and its location in a region characterized by large labor supply deficits in occupations critical to the firm’s operations. Within five years of incorporation, EAS oversaw a trained workforce of 4,800 individuals, most of whom previously had no ties to the formal labor market or to industrial work in general. When public funds for training are notoriously inadequate and private firms face poaching externalities and few incentives to provide training themselves, how was this impressive level of human capital formation achieved in such a short period of time? In this paper, I will argue that this outcome was possible on an institutional level because of the way in which new training institutions were “sandwiched” between guarantees provided at both the national and local levels which in turn opened a space within which privately supplied training institutions could flourish. Due to a historical lack of relevant technical expertise in Pernambuco, at the heart of this outcome was the innovative recruitment of skilled, immigrant workers who served as trainers and mentors to the entry-level workforce.

This paper seeks to better understand how barriers to vocational training can be overcome via coordination between market actors and the state as well as innovative human resources strategies (here, tapping into the transnational labor market spanning Brazil and Japan). Specifically, what market and institutional conditions permitted firms to surmount the threat of poaching externalities and make substantial investments in vocational training? Some of these conditions are of course specific to the context of the local labor market. Others, however, are created by national- and global-level economic and political forces which “touch down” at the local level, mediating the opportunities and constraints faced by local actors. What options exist, then, for local actors (firms, local governments and civil society organizations) to react innovatively to these opportunities and constraints in such a way that high levels of vocational training and job quality may be realized?
The literature on vocational training policy generally falls within one of two camps, either supporting decentralized and firm-led vocational training systems or defending top-down investments in training from the state. Those who support decentralization focus on the fact that firm-led training regimes are generally more flexible to the labor demand of employers and are therefore more efficient than government-led programs (Canagarajah et al 2002, World Bank 1995). Along these lines, the World Bank has proposed that “vocational and technical skills are best imparted in the workplace, following general education. The private sector should be directly involved in the provision and governance of vocational schooling” (World Bank 1995). The implication here is that training decisions should be left to individual workers, their employing firms and private-sector training institutions. On the other hand, some commentators suggest that top-down intervention is, in fact, desirable from the perspective of economic development outcomes. From this perspective, without active government support, skills training is likely to be underprovided by the private sector, due to the fact that training institutions resemble public goods (Bennell and Segerstrom 1998, Mathur 1999). Therefore, public subsidies and other forms of support for training can have positive outcomes in terms of productivity and job quality (Bennell and Segerstrom 1998, Holzer et al 1993). How is the policy-maker to make sense of these seemingly contradictory conclusions?

I will attempt to answer the above questions by leveraging an in-depth case study of Estaleiro Atlântico Sul (EAS), in the Suape Port Complex region of Pernambuco State in Northeast Brazil. This firm was chosen for study because of both the sheer scale of the shipyard\(^1\) as well as the extent of the workforce obstacles faced by the firm. That is, the firm managed to achieve a high speed to production in spite of being located in a region characterized by a long-standing deficit in crucial types of skilled workers and in experienced industrial workers. When the literature leads us

\(^1\)EstaleiroAtlânticoSul is currently the largest naval and offshore production shipyard in South America.
to expect significant barriers to the formation of robust training institutions, we are left with the following question: How did EAS manage to achieve, virtually from scratch, such impressive outcomes in terms of skill formation?

The evidence from EAS suggests that the successful creation of vocational training institutions was achieved not by decentralized or state-led processes alone, but rather through the “sandwiching” of new training institutions between both top-down and bottom-up investments. These investments, which were made by the firm, local government, the non-profit sector and the national government, provided a framework of mutual guarantees to each party within which training institutions could be inserted and sustained. Indeed, this case speaks to the question of how national resources can be effectively leveraged to reach goals which must be achieved at the local level. Focusing in on the firm, this outcome has been to some extent facilitated by the labor market power of EAS, as the firm has gone out of its way to make place-based investments which serve to embed its workforce within the local community, thus overcoming medium- and long-term problems associated with workforce retention. Apart from these new vocational training programs, at the firm-level, an innovative recruitment strategy played a critical role in EAS’ ability to achieve rapid workforce upgrading by creating a source of experienced mentors. While importing skilled supervisors from abroad is not an new strategy for providing shop-floor mentorship (Amsden 1989), EAS managed to overcome a common barrier to this mentoring strategy, poor communication stemming from the lack of a common language, by creatively recruiting Japanese-Brazilian return migrants with years of manufacturing experience in Japanese industry.

EAS will figure as the protagonist in this story, because the main dependent variable of interest is the provision of vocational training and workforce development by a private firm. As I describe the creation of a regional vocational training system, however, I will introduce other local-
and nation-level public actors as well as other private actors, because EAS’ investments themselves leveraged – and were leveraged by – the actions of these other organizations. Furthermore, when highlighting aspects the vocational training institutions in the Suape region, I will focus the majority of my attention on the vocational training institutions that emerged for welders in particular because 1) many of the welders hired by EAS had previously been informal sector workers such that their employment involved a transition into formality; 2) the training sequence required for welders involves a mix of transferable, and firm-specific skills, whose supply requires the management of significant coordination issues; and 3) given local skills deficits, the recruitment of experienced mentors involved the extraordinary measure of repatriating Brazilian workers from Japan to Pernambuco. These considerations each feed into the questions of why EAS made investments in providing workers with transferable skills and how inputs into the vocational training system were identified and opportunistically seized upon.

This study makes use of qualitative evidence gained from media and archival research and in-depth interviews with researchers and industry experts. The choice of interview subjects was informed by both the review of news articles as well as by snowball sampling method. This paper also pulls in evidence and testimony acquired from media reviews of major Brazilian national and local (to Pernambuco) newspapers, principally Estado de Sao Paulo, Folha de Sao Paulo, Valor Economico, Jornal do Commercio and Jornal de Pernambuco. Further information and individual worker profiles were also incorporated from Nippo-Brasil, a weekly newspaper that serves the Japanese-Brazilian population in Brazil. This news review reached as far back as 2005, just prior to the 2006 incorporation of EAS. Policy reports from the Instituto de Pesquisa Economic Aplicada (IPEA; English: Institute for Applied Economic Research), Brazil’s government-led economic and social research center, were also reviewed in order to understand the causes and effects of skills shortages
in the country. Finally, information culled from reports issued by Petrobras, Prominp and Senai has also been incorporated into this paper.

There are a number of themes that emerge from this case that speak directly to the policy debates about private investment in training and skills upgrading. Principally, while firm-driven investments in training were a key part of the story, the role of local public sector institutions was critical to leveraging and upscaling these investments. For example, while EAS took the first step in making large investments in training, support from local public bodies permitted EAS and other regional players leveraged these initial investments into additional support through top-down channels. Thus, methodologically, it is useful to conceptualize the training institutions that emerged in this case as “sandwiched” between bottom-up and top-down forces. While in many instances national- and global-level political and economic developments shaped the opportunities available to local actors, the agency of local actors and their ability to form partnerships and coalitions was critical to actually identifying and seizing upon these openings. Additionally, at the individual-level, the economic decision-making of both the local and internationally recruited workers is itself situated within broader considerations of social and professional status. An important consideration in this regard is the fact that employment at EAS gave employees – many for the first time in their lives – access to the benefits of formal employment, such as health insurance and a pension plan. Beyond this, however, many of the firm’s investments served to embed itself and its workforce within the local community through, for example, the construction of new schools, the creation of new bus transportation routes and the upgrading of the local housing stock. This mix of individually and socially targeted investments helps to explain the loyalty of workers to EAS, which in turn impacts worker retention rates and thus the workforce investment calculations of the firm. Finally, the recruitment of Japanese-Brazilian trainers serves as an innovative example of how local actors can leverage increasingly transnational labor markets in order to fill specific skill gaps.
In the remainder of the paper, I will describe the creation of different aspects of the vocational training system that arose in the Suape Port Complex region, both internally and externally to EAS. In the next chapter, I will provide a brief literature review outlining relevant discussions regarding human capital formation and the creation of viable training institutions. I will then provide some contextual information regarding current labor market conditions in Brazil and the Suape region, focusing particular on the naval construction industry. I will also introduce the various actors that have played significant roles in supporting the emergent vocational training system in Suape. Next, in Chapter 4, I will zoom in on EAS to describe the firm’s organizational structure and other relevant background information. In Chapter 5, I will describe the actions of EAS and other regional players which contributed to the formation of vocational training institutions, while tying these developments into considerations of the internal labor market of the shipyard. Given the depth of the skills deficit in the region, in Chapter 6 I will focus on an aspect of EAS’ recruitment strategy – the repatriation of Japanese-Brazilian workers from Japan – and the role of these workers in providing experience and mentorship to less experienced, locally hired workers. Finally, I will attempt to draw some conclusions regarding key lessons that might be learned from the EAS case as well as planning and policy implications which might travel to other labor market contexts.

Chapter II: Literature Review

Broadly speaking, this is a story of human capital formation, which is widely recognized as a critical factor in economic growth and development, not only at the national level but also within regional economies and individual firms. Recently, in fact, the World Bank has supported the position that investments in human capital will be essential for future economic development in Brazil and other Latin American countries (Maloney and Saavedra-Chanduvi 2007). This
recommendation is reinforced by a number of macroeconomic studies which have demonstrated a statistically significant link between human capital accumulation and positive economic growth outcomes across countries (Barro 1991, Romer 1989). It should be mentioned, of course, that even though most indicators of human capital accumulation measure years of formal schooling or scores on general-skills exams, vocational training may play an even more important role than general education in improving productivity levels (Acemoglu and Pischke 1999). Indeed, high levels of training and certification have been found to be correlated not only with firm productivity and competitiveness but also with national economic growth (Blundell et al 1999). Given the growing evidence that human capital serves as a crucial engine of economic growth, it is not surprising that policy makers and analysts are becoming increasingly interested in education and workforce training.

While this emphasis on human capital accumulation may serve as a helpful guide for government decision-makers as they set investment priorities, within the Brazilian context it also underscores that low levels of educational attainment could pose a threat to the country’s future economic development. Even though Brazilian public policy during the last 15 years has drastically expanded and equalized opportunities for schooling and training, educational attainment remains relatively low and unevenly distributed compared to other Latin American countries (Barros et al 2010). Furthermore, low levels of education are especially pronounced in Northeastern Brazil, where both literacy rates and wages are low in comparison to the rest of the country, and firms and local governments have pursued a low-skill, low-wage strategy of economic development (Tendler 2002). Increasing human capital stocks and overcoming this low-skill equilibrium, then, must be a cornerstone of economic development strategies in both the Suape Port Complex region and the rest of the country. Human capital formation is also a critical precondition for overcoming the skills shortages currently affecting the petrochemical, civil construction and other industries in Brazil.
The sustainable provision of vocational training institutions that might overcome existing skills shortages, however, is notoriously difficult to achieve. The crux of this observation is that while all firms within a labor market benefit from a plentiful supply of skilled workers, any individual firm faces the incentive to “free ride” – that is, to shirk investments in vocational training and instead “poach” trained workers from other firms which have provided training to their own workers. This phenomenon, in which the returns to investments in training made by one firm are accrued to another firm via recruitment, is generally referred to as a “poaching externality,” and it exists due to the presence of a class of skills termed “transferable skills,” which, in contrast to firm-specific skills, are of value to multiple firms within a given labor market (Stevens 1996, Acemoglu and Pischke 1999). Thus, when private firms provide training, the returns to these investments are realized by three parties: the training firm, the worker and external firms. When a firm is led to believe that some of the benefits of its training may be poached by other firms, that firm will, following microeconomic logic, under-invest in training. By this argument, the conclusion is that firms will only invest in specific skills, i.e. those that are of value to only that particular firm, and that workers will themselves invest in general skills that are of value to multiple employers (Becker 1964).

When labor markets are competitive, wages achieve equilibrium rates such that workers receive a return on their investments in human capital; support on the part of the government to facilitate human capital formation only serves to distort labor markets. Within this framework, then, the main constraint limiting workers’ accumulation of new skills is the lack of access to capital for investment in general skills training. The main point here is that firms under-invest in general skills out of fear of poaching, but workers are not always able to finance individual investments in training and education.

In reality, however, we see a number of cases in which firms themselves make substantial investments to provide workers with skills that might be of value to multiple employers. The
question then becomes: under what conditions will firms find it worthwhile to make substantial contributions to ensuring a plentiful supply of skills to the labor market? There is a growing literature which attempts to answer this question, and these explanations generally point towards the role that institutions play in creating incentives for both workers and firms to invest in vocational education (Finegold and Soskice 1988, Stevens 1996, Acemoglu and Pischke 1999, Thelen 2004). Indeed, the role of institutions is especially important when capital or labor market imperfections lead to an under-supply of skilled workers. For example, when households cannot freely access financial markets, their ability to make continued investments in human capital is challenged (Jacoby and Skoufias 1996). Likewise, when wages for skilled workers are too low, then households will have little incentive to invest in education or training in the first place. It might be noted here that both of these situations posed barriers to skills formation in the Suape Port Complex. Indeed, wages for skilled workers in much of Northeastern Brazil are significantly below those for comparable workers in the Southern region of the country. Furthermore, more than half of the workforce works in the informal sector, which means that many workers do not have formal employment contracts or contribute to payroll taxes. This limits the ability of these informal workers to gain access to formal credit markets, through which they might finance educational or training investments. When market imperfections characterize particular labor markets, then, the equilibrium stock of skills might be below the optimal level, and it becomes necessary to explore how robust institutions can be built in order to provide additional skills training.

In this paper, we are primarily concerned with processes of human capital accumulation through firm-supported vocational training, where the most important relationship is that which exists between the employer (the supplier of human capital) and the worker (the locus of human capital accumulation). For stable, firm-supported training institutions to arise, “the key problem… lies in the difficulty of establishing credible commitment between the trainee and the training firm”
That is, firms will resist providing training to workers if there is no assurance that apprentices will remain employed within the firm. At the same time, workers are unlikely to invest their time and resources in gaining new skills without a guarantee that these investments will be rewarded in the labor market through higher wages and stable employment. When some mutual commitment exists, the firm agrees to provide high quality training in transferable skills in exchange for some reassurance on the part of the trainee that he or she will remain within the firm, at least until the firm has recovered the sunk costs of providing training. The provision of credible commitment in turn requires an institutional framework, usually some sort of skill certification regime, which monitors the behavior of both firms and workers (Acemoglu and Pischke 1999, Thelen 2004). On the one hand, firms must maintain high standards of training, or else they will lose their authority to certify workers. On the other, workers must remain at the firm for a long enough time in order to receive their certification and thus the capability to signal to the market control over the certified skill or mix of skills.

The issue of retention is an important factor in reducing the threat that poaching might deter firms from making training investments. When retention rates are low, the sunk costs that firms invest in training are lost. There is a benefit, then to firms maintaining the loyalty of their workforce. In the EAS case, it emerges that the firm attained high levels of loyalty through a variety of strategies, including investments in skills. Beyond these workplace-specific investments, however, the shipyard also made investments in educational services and infrastructure which improved the local quality of life and helped to embed workers within the place.

It is important, then, to keep in mind that embedding training within these broader strategies of workforce management can help to instill loyalty to the firm, thus increasing retention rates and thereby overcoming some of the threat of poaching (Giloth 2000, Fitzgerald 2006). That
is, within the context of the above discussion of vocational training institutions, we might conceptualize loyalty as a source of credible commitment, a necessary ingredient in ensuring the long-term sustainability of these institutions. In the case detailed below, I will explore how both firm-based strategies to increase worker loyalty and a variety of top-down and bottom-up institutional factors opened a space for vocational training institutions to arise within EAS and the Suape Port Complex region, which, ultimately, created new career opportunities for local workers.

Chapter III: Context

The workforce development issues facing EAS and the Suape Port Complex region are, of course, themselves nested within a broader, national economic development context of rapid growth as Brazil joins a small set of emerging economies that are bucking the recessionary trends of the last few years, realizing relatively consistent economic growth and industrial modernization. A leading source of this growth is the unprecedented expansion of the country’s petrochemical industry, along with its energy, construction and infrastructure sectors. This swift, multi-sector growth has in turn led to a massive labor and skills shortage as these technically advanced sectors absorb workers at a rapid pace. This skills shortage (or tight labor market) is important to the questions at hand, because it not only produces demand for additional workers but it also shapes the decision-making of firms in terms of training investments. When skills are in short supply and unable to meet demand, investments in training within individual can become complicated by threats of poaching, even as publicly and quasi-publicly funded institutions arise in order to overcome this poaching externality. The skills shortage has also exposed a further underlying weakness in the labor market: a lack of experienced workers available to perform an on-the-job training function. EAS was eventually able to innovatively overcome this obstacle by recruiting from Japan workers with several years of relevant experience in the Japanese manufacturing sector.
The Brazilian petrochemicals industry has expanded rapidly over the last decade, led by the Programa de Modernização da Indústria Nacional Petróleo e Gas Natural (PROMINP; English: Petroleum and Natural Gas Industry Modernization Program), which was formed in 2003 by the Ministry of Mining and Energy with the goal of increasing oil and natural gas production so that Brazil could become a net exporter of oil\(^2\). The efforts of PROMINP to mobilize the petrochemical industry will induce greater demand among supplying industries, including the naval construction industry to which EAS belongs. Furthermore, the discovery of the so-called Pre-Salt\(^3\) oil deposit in the Santo Basin off the coast of Rio de Janeiro State in 2007 has added to the pressures on the nation’s petrochemical industry. Indeed, the Pre-saltfields comprise the largest oil discovery since the 1970’s and could propel Brazil into a major petroleum exporting position. As a result of this discovery, PROMINP hopes to double the country’s oil capacity from 2 million barrels of oil equivalent per day to 4 million barrels by 2015. By 2020, this number is projected to be 5.3 million barrels per day (Petrobras 2010). In order to meet these goals, Petrobras has been massively ramping up investments in capital, workforce upgrading and research and development from US$112 billion in its 2008-2012 five-year plan to US$220 billion in its 2010-2014 plan (PROMINP). Thus far, Petrobras has invested roughly US$160 million in order to train 78,000 professionals, mostly through the Sistema-S system of vocational and trade schools. In all, Petrobras estimates that it will require an anticipated 207,000 new professionals, mostly in the shipbuilding sector, in order to fully operationalize the Pre-Sal investments (Petrobras 2010).

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\(^2\) This program is overseen by a Directive Committee consisting of the Ministry of Mining and Energy; the Ministry of Development, Industry and Trade; the semi-public Petrobras oil company; the Banco Nacional de Desenvolvimento Econômico e Social (BNDES; English: National Economic and Social Development Bank); and two industry associations representing the petrochemical industry. Additionally, eight industry and professional organizations are represented on the Executive Committee.

\(^3\) Pre-salt is so called because the oil reserves are located beneath a layer of salt, roughly 8 kilometers below sea level.
In terms of the naval construction industry, these capital investments include the procurement of 52 large vessels on behalf of Transpetro, the logistics subsidiary of Petrobras, and seven new drilling platforms on behalf of Petrobras itself. In addition to this, the expansion of other sectors, particularly the mineral extraction industry, has further generated labor demand within the shipbuilding industry. As a result of these pressures, the president of SINAVAL, the shipbuilding employers association to which EAS belongs, estimates that there will be roughly 430 new vessels constructed in Brazil by 2015, causing employment in the naval construction industry to double from 50,000 to 100,0000 employees (O Globo 1/16/2011).

Given this context of rapid growth, a shortage of skilled workers is to be expected and is indeed on everyone’s list of challenges limiting the growth of the petrochemical complex in Brazil. Disaggregated occupational analysis conducted by IPEA demonstrates that engineers and technical workers in the extractive and naval construction industries are undersupplied, as indicated by the fact that unemployment rates are historically low and extraordinary wage premiums are not uncommon (Pompermeyer et al. 2011, Maciente and Araújo 2011). In the mineral, oil and natural gas extractive industries, for example, employers pay 20% more than the national median across comparable occupations in other sectors in order to hold on to their workers (Folha de São Paulo, 2/6/2010). In 2007, PROMINP identified critical shortages in 44 occupations critical to the petrochemical industry and its suppliers (PROMINP). Of these, only five occupations require a high (“superior”) level of training; 18 call for a medium level of qualification, and 21 entail basic levels of

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4 EAS holds contracts with Transpetro to produce 22 of these 52 vessels and with Petrobras for 2 of the 7 platforms.
5 At highly aggregated levels of industrial or occupational employment, however, the presence of a skills shortage or human capital shortfall remains invisible (Nascimento et al. 2010). That is, while overall estimates of skills premiums in the economy as a whole fail to uncover an aggregate human capital shortage in the Brazilian economy, more fine-grained calculations reveal large and growing premiums in particular occupations and industries. Aside from petrochemicals and naval construction, the civil construction and mineral extraction industries are also facing large skills shortfalls (Naciente and Araújo 2011).
training (of less than a year). Welding, the main job category considered in this paper, is one of the primary undersupplied occupations which requires basic training.

The ability of national training and educational systems, however, has been unable to keep pace with these trends. This observation is consistent with the fact that overall levels of human capital investments, including formal education and training, in Brazil are generally low (Barros et al 2006, Barros et al 2010). As of 2000, expenditures on education in Brazil amounted to 4.0% of GDP (it is now 5.2%), which was below the spending levels in countries at comparable levels of growth such as India, Mexico and Argentina6 (UNDP 2008). Hence, educational attainment remains relatively low in Brazil. Among those aged 25-59, average educational attainment is 7.5 years for the country overall7 (IBGE 2008). When levels of basic education are low, then it is more likely that remedial education in mathematics and language skills will become necessary in vocational training, thus raising the overall training costs to firms and external organizations. Low investments in worker training is itself tied to the fact that worker turnover in Brazil is relatively high – fully one third of the labor force changes jobs every year (Carneiro et al 2006). When turnover is high, firms will be more hesitant to make investments in the skills portfolios of their workers.

The petrochemicals and shipbuilding industries were, prior to the mid-2000’s, relatively weak in Brazil, having largely been wiped out by the debt crisis of the 1980’s and the hyperinflation of the early 1990’s (Pessoa, personal interview). Thus, there are relatively few experienced workers in these industries. Not only does this situation exacerbate the current skills shortage facing employers, but it also makes training more difficult because there are fewer workers available to give training to apprentices and provide mentorship to new employees. As will be demonstrated below, this lack of

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6 It is higher than that of China, however, which remains at 2.3% of GDP.
7 In Pernambuco state, where EAS is located, this figure is only 6.4 years.
experienced workers created a challenge for EAS which the firm eventually overcame by recruiting welders from Japan.

Given this skills shortage and the aforementioned barriers to providing workers with new skills, a number of companies have been compelled to hire workers from abroad in order to meet short-term workforce needs. The granting of work visas to foreigners has been increasing at an average annual rate of 17% in recent years, and nearly 180,000 professionals from around the world have been admitted to Brazil in the last five years. Of these 180,000, fully 90% received their work visa on account of the specialized skills that they possess, as opposed to other considerations such as family reunification or political asylum (Máximo et al 2010). As summed up by economist André Portella of the Fundação Getúlio Vargas economic research institute, “since our educational system does not react with the speed required of the market, obviously firms are going to want to satisfy their demands importing labor” (quoted in Máximo 2010).

Such a solution cannot be viable in the long term, however, and so domestic vocational training and educational institutions will need to increase their capacity in order for labor demand to be met. The key players in this process are private firms, the Sistema-S network of vocational schools and the national education system of schools, colleges and universities. In the face of the skills shortage and tight labor market conditions, companies have been lowering hiring standards and relying more on training in order to meet their requirements for qualified labor (Bueno et al 2010). These training programs, offered in-house or in partnership with the public or private system of universities and trade schools, cover skills that are not commonly provided by firms. For example, Companhia Vale do Rio Doce, a large multinational mining corporation, has famously begun offering graduate-level courses in engineering and management, whose certification is recognized by the Ministry of Education and Culture (Carvalho 2006, Oscar 2010). While it is
expected that firms will provide training in non-transferable skills, programs such as these are equipping workers with transferable skills that are of value to multiple firms are, theoretically, surprising and unusual.

The Sistema-S is a network of secondary-level professional and trade schools that are maintained by the Confederação Brasileiro da Industria (CBI; English: Brazilian Confederation of Industry), the country’s main employer association. Though controlled by the CBI, Sistema-S was formed as a non-profit organization by a series of laws passed in 1942 under the authoritarian Vargas administration. Consequently, the organization routinely receives public funding and partners with the government on targeted training initiatives, such as the PROMINP programs (Cunha 2000). Included within Sistema-S are Senai (ServiçoNacional de Aprendizagem Industrial; English: National Service of Industrial Education), Sesi (Serviço Social da Industria) and a handful of other subsidiary branches, each of which concentrates on a different set of clients. Senai, for example, focuses on training for industry, whereas other branches provide training for agricultural occupations or the service sector. Sistema-S operates in all states in Brazil through a network of 1,800 training centers and is funded through a compulsory 2.5% payroll tax on (formal sector) workers. Sistema-S consults with local employers regarding their skills needs and is highly successful in placing graduates into jobs. A recent survey of Brazilian employers carried out by Senai found that 90% prefer to hire graduates of Senai and that 76% of those who have received training through the organization were employed at the time of the study, 81% of these in the formal sector (Senai 2009a). In other words, Sistema-S, the main national-level organization in charge of workforce training, has demonstrated itself to be an effective instrument of skills upgrading and job-matching in Brazil. Through Senai, it has filled critical gaps in the organization of vocational training in the Suape Port Complex region, a role which will be explained in greater detail below.
The national education system is the final main source of education and training in Brazil and includes the primary, middle and secondary schools as well as universities and trade schools. Since these institutions play just a minor role in the EAS case, I will provide only some cursory details here. As mentioned above, primary and secondary education is not well funded, nor does it produce high levels of educational attainment. As for the higher education system, most university students attend private institutions. Private colleges and universities, however, are generally of poorer quality than their public counterparts, particularly in the key technical subjects of science and engineering (Gusso and Nascimento 2011). As for the technical high schools, these provide training similar to that offered by Sistema-S, though their geographic reach is much smaller and rarely extends outside of major cities. Given that EAS is located in a remote site that historically lacks a strong network of public and private colleges and universities, these institutions have played a negligible role in the case presented below.

Chapter IV: Training a local workforce at the Southern Hemisphere’s largest shipyard

Estaleiro Atlântico Sul (EAS; English: South Atlantic Shipyard) was established as a privately owned firm in 2005 through a partnership between the private Brazilian investment groups Carmargo Corrêa and Quiroz Galvão and the Brazilian equity holding and ventures management company PJMR Empreendimentos. This partnership was formed in order to capture some of the investments planned by Transpetro’s PROMEF (Programa de Modernização e Expansão da Frota da Transpetro; English: Program for the Modernization and Expansion of the Transpetro Fleet), a massive procurement program announced in 2005 by the logistics subsidiary of Petrobras to purchase 49 new vessels. PROMEF itself, originating from a semi-publicly owned corporation, is a component of the Brazilian government’s PAC (Programa de Aceleração do Crescimento; English: Growth Acceleration Program) industrial policy initiative and therefore as a local procurement
clause which requires that ships procured with PAC funds be produced in Brazil using 70% domestic inputs. By 2008, Samsung Heavy Industries (SHI) invested in a 10 percent equity share of EAS and became a technology partner. Even though EAS ownership was initially reluctant to take on SHI, it soon realized that the shipyard would have trouble reaching international competitiveness without an international partner to facilitate the transfer of technologies that are critical to modern shipbuilding processes (Costa, personal interview). Under the agreement, SHI would provide US$29 million worth of technical support, including drawings for a 15,000 tonne-class standard oil tanker, provide knowledge on safety management and procurement, and assist with worker training for shipbuilding techniques (Samsung 2008) in exchange for a 10% equity share in the company and the option to outsource some production from South Korea to the Brazilian shipyard. According to the estimates of the company as well as public sector observers, upon beginning operations in 2009 EAS would be the largest, most modern and most efficient shipbuilder in the Southern Hemisphere, capable of processing 160,000 tons of steel per year and with an area of 1.5 million square meters.

After two years of planning, excavation and construction began in the town of Ipojuca, located in the Suape Port Complex in the State of Pernambuco. After a competitive bidding process (limited to domestic shipbuilders), EAS secured contracts to build 24 of the 49 ships commissioned by Transpetro’s PROMEF program, including 10 Suezmax (160,000 DWT), 5 Aramax (110,000 DWT), 4 Suezmax dynamic positioning support vessels and 5 Aframax dynamic positioning support vessels. The shipyard also was contracted to build the hull for Petrobras’ P-55 platform. These contracts have a combined value of $3.5 billion and are expected to be fulfilled by 2016 (Petrobras

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8According to Samsung’s Vice President, Seoyo Kim: “There are a variety of possibilities with this deal. Five years from now [June, 2008], there is certainly a possibility of outsourcing part of the work there [in South Korea] to AtlânticoSul” (Jornal do Comércio 6/11/2008). Transpetro has estimated that by 2013 Samsung could outsource the production of 20 vessels to EAS.
EAS expects that by this time, it will have reached productivity levels that will allow it to bid competitively on international contracts.

To properly convey the workforce challenges that faced EAS and other Brazilian shipbuilders, it is necessary to provide some historical perspective. It should be noted that while in the 1970's Brazil had the second largest shipbuilding industry in the world in terms of the value of its order books, the industry more or less collapsed in the 1980's as a result of hyperinflation and the end of government subsidies which had been put into place under the old import substitution industrialization strategy. As import substitution policies began to be phased out in the 1980's, production subsidies were also removed. By 2010, no large vessels had been built in Brazil for thirteen years, and the last ship to be completed had taken 10 years to build (Costa, personal interview). But today, in less than five years, Brazil’s shipbuilding industry has turned around and ranks fourth in the world, in terms of the value of its order books. This surprising achievement and the speed with which it was achieved is in large part due to investments made through PAC and PROMEF. Importantly, then, Petrobras – and by extension the Brazilian government – became an important stakeholder in EAS and therefore developed a strong interest in ensuring that the shipyard could follow through on its contracts. As production ramped up, shipbuilders throughout the country faced a labor market that is in short supply of workers with the skills and knowledge relevant to 21st Century shipbuilding, especially in light of the industry’s stagnation over the last twenty years. This interdependent relationship between the government and EAS was important in facilitating new investments from the government, the social partners (particularly the national employer association which oversees Senai), and the semi-public sector that would be directed towards the consolidation of an interconnected and layered series of training programs in the Suape Port Complex region.
Geographic issues also pose challenges in terms of EAS’ ability to gain access to qualified workers. Even though Brazil’s shipbuilding industry has tended to traditionally concentrate in Rio de Janeiro in the Southeast, the Suape region in the Northeast (roughly 2,500 kilometers north of Rio de Janeiro), was chosen as the site for EAS in order to facilitate exports because of its proximity to North America, Europe and the Panama Canal. Pernambuco, however, is a poor state with relatively low levels of educational attainment and very little experience in modern industrial production. As of 2005, the economy of the five administrative districts that comprise the Suape region was reliant upon sugar cane harvesting; there were few workers qualified to work in a modern industrial setting. Professionals prepared to work in the shipbuilding industry were virtually non-existent. In spite of these challenges, however, the EAS was committed to hiring a predominately local workforce.

Indeed, by 2010 the shipyard had roughly 4,800 employees, 80% of whom were native to Pernambuco (Diario do Nordeste 3/17/2010; Costa, personal interview). This achievement was reached through the establishment of an aggressive system of training institutions in the Suape region that were supplied not only by EAS but also through the public training system. In this section, I will explain the main components of the internal and external vocational education and training programs that prepared workers for EAS’ shipbuilding operations, focusing especially on the preparation of qualified welders. I will argue that these training programs not only provide workers with marketable skills, but they do so in a context that approximates aspects of high performance work systems. In addition, I will consider the innovative recruitment of Japanese-Brazilian return migrants who were embedded within work teams not only to serve as experienced welders but also to facilitate the transfer of relevant skills to less experienced team members.

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9The annual per-capita income in Pernambuco in 2005 was R$5,931 compared to $11,658 in Brazil (IBGE). In percentage terms, per-capita income in Pernambuco is 50.9% of the national average.
Chapter V: Preparing a workforce from scratch

In order to actually begin operations as the Southern Hemisphere’s largest shipbuilder, EAS needed to prepare workers for a variety of jobs, including welders, assemblypersons, electricians, painters, naval plumbers, coppersmiths, engineers, designers and managers. In order to train a local workforce that had virtually no shipbuilding experience, EAS invested R$16 million (US$9.5 million) in training programs between 2008 and 2010 and, in partnership with local municipal governments, reached out to the federal vocational training system for additional support. The Brazilian government played an important role in inducing these investments by attaching conditions to debt financing offered through the BNDES (National Economic and Social Development Bank). According to the loan terms, EAS must put 1% of the total project investment (R$670 million or roughly US$400 million) towards works tied to social responsibility, such as schools, worker training programs and infrastructure upgrading. The investments made by EAS in these areas, particularly in training and housing for its workers, exceeded the minimum requirements set by BNDES. Compared to a minimum required investment of R$6.7, the R$16 million invested in training is more than twice the amount that the shipyard was contractually obligated to spend. The firm made additional social investments in the local education system, including facilities improvements in public schools and a mobile library program. In addition, EAS spent approximately R$78 million on the Habitação (English: Habitation) Program in order to construct 1,328 homes for its workers and their families (EAS, 7/26/2010). While these programs constitute a significant cost for EAS, I argue that they also serve to embed the firm’s workers within the region, which helps to build loyalty to the employer and tie them to the place.

The first investments made by EAS went towards creating an education center in Ipojuca called the Nacedouro dos Talentos (Birthplace of Talent), a school whose primary purpose was to
provide remedial education to the local population. The school, which opened in 2007 in former
slaughterhouse that EAS purchased, has a capacity of 600 students and focused on providing general
skills to the residents of the area: mathematics, literacy and critical thinking. While EAS initially
covered the operational costs associated with the school, the Nacedouro dos Talentos subsequently
became an official part of the local Municipal Education Department, and the funding of the
school’s operations was assumed by the state government. In 2008, EAS carried out a similar
project on Tatuoca Island, part of which is owned by the shipyard and used for naval construction.
Through the Tatuoca Program, EAS has renovated the dilapidated Santo André community school
to provide remedial education and marketable skills to those living on the island. The educational
services within the school are contracted out to Sistema-S, the privately run, nation-wide system of
vocational education schools.\footnote{While technically a private organization, Sistema-S was created through decree by the Ministry of Social
Protection in 1943, and its operations are planned in close collaboration with government policy-makers and
bureaucrats. This particular curriculum is a part of the Serviço Social da Indústria (SESI), the arm of Sistema-S
which focuses on social welfare and cultural development as opposed to workplace skills \textit{per se}.}

From an operational standpoint, EAS needed workers with firm- and industry-specific skills,
particularly in welding, assembly work and other technical jobs. In order to impart these skills, EAS
pursued a two-prong strategy, (1) creating its own internal training system through the Engeniero C.
E. VasconcelosCentro de Treinamento (Training Center) and (2) forming a partnership with an
external organization, the Serviço Nacional de Aprendizagem Industrial (Senai; English: National
Service for Industrial Learning), the branch of Sistema-S that provides vocational training for
industrial workers. To explain the system, I will focus on specifically on the training of welders, who
comprise the largest share of employees at EAS.

For the internal training aspect of its Human Resources strategy, EAS initially relied on two
sources of skilled and experienced workers to provide training. On the one hand, there was a pool
of skilled welders with experience in shipbuilding in Rio de Janeiro, the old hub of Brazilian
shipbuilding. EAS tapped into this group of workers by recruiting some to come to Pernambuco to
provide training and also by sending some workers from Suape to Rio de Janeiro to be trained in the
city’s vocational training schools. On the other hand, EAS attempted to take advantage of its
partnership with Samsung by importing skilled welders from the Korean shipyard to provide
instruction both via the Training Center in Pernambuco and on-the-job at the shipbuilding site.
Even though it was actually cheaper for EAS (the Korean trainers remained on Samsung’s payroll),
this second strategy proved unsuccessful for the most part because of the language barrier (Costa,
personal interview). Since the communication was impossible between these workers of different
nationality, the Brazilians could only watch and try to emulate what the Koreans were doing; it was
virtually impossible to convey information in “real time.” This obstacle was eventually overcome
through the shipyard’s recruitment of Brazilian-Japanese workers from Japan, which will be
described in greater detail in the following chapter.

At the same time, EAS formed a partnership with the five administrative districts\textsuperscript{11} in Suape
beginning in 2007 in order to lobby for increased funding from Sistema-S to support the Senai
training center in the Cabo de Santo Agostinho\textsuperscript{12}. As a result, the school received R$26 million
(US$15.6 million) from the national office of Sistema-S to modernize its facilities and programs
(Murillo 2010). Of course, while EAS was a large consumer of the trained workers produced by
Senai, particularly welders, the newly modernized facility was a public good that benefited other local
employers by providing remedial education and skills training in a variety of occupations, such as
plumbing, brass work and carpentry. In crafting the curricula for these programs, Senai coordinators
consulted not only with EAS but also with other area employers in order to ensure that the content

\begin{footnotesize}
\begin{itemize}
  \item[Ipojuca, Cabo de Santo Agostinho, Jaboatão dos Guararapes, Moreno, and Escada]
  \item[This Senai training center is administratively independent of the education and training centers mentioned above.]
\end{itemize}
\end{footnotesize}
of its courses would be adequate to their needs. As for its courses for welders and naval assemblypersons, by the beginning of 2010, the Cabo de Santo Agostinho branch of Senai graduated roughly 2,800 individuals, 2,075 (74%) of whom went on to be hired by EAS (Senai 2009a). It planned to continue training large numbers of welders for the next six to eight years in order to satisfy the skills demand of the still-growing shipbuilding industry (at least two other shipyards will begin operations in the area by 2012) as well as to provide workers for two other upcoming projects: the construction of a railroad and the transposition of the São Francisco River. The majority of the apprentices who participate in Senai’s technical training programs are between the ages of 14 (the youngest age at which one can legally enter an apprenticeship contract in Brazil) and 21, though a handful of older individuals also participate (Jornal do Commercio 8/14/2010).

In addition to partnering with the administrative districts for the purpose of lobbying Senai, EAS worked with local governments towards the goal of recruiting workers. Beginning in February, 2009, through its Programa de QualificaçãoProfissional II (Professional Qualification Program II), EAS held recruitment workshops in partnership with the state government offices of the Departments of Labor and of Education. Workshops were in Sistema-S offices in the Suape area. The goal of these workshops was the recruitment of 2,000 industrial workers who would then receive training and be incorporated into EAS workforce. To be eligible for recruitment, individuals must have completed or be concurrently enrolled in the fourth grade of primary education.

Through these various institutions, a pathway has emerged which has been followed by a number of welders who would work for EAS. First, individuals would receive three or more months of remedial education (depending on the amount of education required), usually through Senai or Sesi. These remedial courses focus on basic mathematics and literacy in the Portuguese language. Those who passed this course would then become eligible to register for Senai’s basic
welding class, which also lasts three months. It should be stressed that this course, while it incorporates some practical training, remains rather basic; graduates are not yet ready to be placed directly on the production line. Finally, those individuals who show the most promise are offered employment at EAS and, if they accept, receive a second round of training at the shipyard itself, through the Training Center and through on-the-job training. Thus, for individuals who wish to become welders at EAS, there is a relatively straightforward and direct training pathway that can be followed, which combines training that is funded in part through the National Confederation of Industry (the employers association which administers Sistema-S) and in part through EAS itself. Additional support is provided through the government via PROMINP funding and technical assistance from Petrobras in the form of free curricula and consulting services. EAS estimates that the median monthly training cost per student hired is R$3,748 (SUPORT-BA 2011).

The integration of the remedial education and training programs offered by Senai with EAS’ own personnel system reduces costs for the shipyard by both covering some of the costs of worker preparation and also by cutting down on labor market search costs. In fact, four out of five workers hired by EAS have passed through Sistema-S courses at the Cabo de Santo Agustino facility (Senai 2009b). The input of employers like EAS into the structure of training curricula is important in facilitating this transition. According to the President of EAS, Angelo Bellelis, “The partnership is highly important, because Senai provides a professional base for people that start at the shipyard. What they bring with them is fundamental so that they understand the language of the naval industry” (Quoted in Senai 2009b). This point highlights the fact that a crucial part of the training process is not only simply the provision of skills but also situating the worker within a community of professionals.
For more knowledge-intensive occupations, the pathway to training is slightly different. Upper level managers, for example, are mostly sent to Korea for training at Samsung’s shipyard, where they learn the newest (Fourth Generation) production methods in shipbuilding. The Korean connection provides EAS with an enormous competitive advantage relative to Rio de Janeiro-based shipbuilders who, regardless of the deep labor pool that they can tap, still use production technology from the 1980’s. That is, they rely too heavily on labor-intensive technologies when more efficient, capital-intensive processes are available. Similarly, in the Rio de Janeiro shipyards, production is organized according to Second and Third Generation models in which management of production is organized by vessel, as opposed to being organized around steps in the naval construction process\(^{13}\) (Costa, personal interview).

As for group leaders in the production process, EAS initiated a new program in 2010 in partnership with Senai and Petrobras to supply in-house training to enhance their leadership and management capabilities. Within this partnership, EAS provided the facilities and funding for the training, while Petrobras supplies the training curricula and educational materials\(^{14}\). The central Senai office for the state of Pernambuco was the body that supplied instructors and actually implemented the program (EAS 5/10/10). It was necessary to train most leaders internally from the existing workforce because of the lack of a significant number of experienced industrial workers in the Suape region.

Thus, through significant investments in training and partnerships with outside organizations, EAS was able to settle upon a system of vocational training that has supplied a workforce of almost 5,000 within five years of the company’s establishment, in spite of the being

\(^{13}\) One of the goals of Transpetro’s PROMINP program is to induce these shipyards to update their management techniques by providing information on best-practices and other forms of free consulting.

\(^{14}\) These were drafted as part of the PROMINP initiative.
located in a region with relatively few industrial workers and virtually no experience in shipbuilding. This accomplishment should not be understated. As Alice Amsden (1989, p. 277) points out in her study of the establishment of Hyundai’s shipyard in Korea, in shipbuilding, “the [production] process is highly embodied in the people” as opposed to the capital equipment. That is, unlike a more capital-intensive industry like steelmaking, shipbuilding requires a particularly highly trained and knowledgeable workforce.

The establishment of this system is surprising not only because of the speed with which it was established or the number of workers that it has trained, but also because of the types of skills that it provides to workers. Traditional human capital theory suggests that firms will invest only in specific skills (which are “non-transportable,” or of value to only that particular firm), while trainees themselves will invest in general skills (which are fully transportable and valuable to many employers). While this general framework seems to be reflected in the human capital investments of individuals and firms in the United States and other liberal market economies (Finegold and Soskice 1988), it is challenged by the case of EAS and the Suape Port Complex region. That is, EAS has actively invested in the basic general skills (literacy, mathematics) of the residents of the Suape region through the Nacedouro dos Talentos and the rehabilitation of the Tatuoca Island schoolhouse. While operational costs eventually fell upon the state Department of Education in the case of the Nacedouro dos Talentos and upon Sistema-S in the case of the Tatuoca Island schoolhouse, in all cases workers themselves are not required to invest their own income in human capital accumulation in either case. In addition, EAS has invested considerable resources in training workers in welding, which is also a general skill, demanded by multiple employers throughout the region and the country – particularly in the current economic environment. It has been noted that labor market imperfections can lead firms to provide employees with general skills when labor market imperfections are present, for example when a monopsony employer dominates a local
economy (Acemoglu and Pischke 1999, Thelen 2004). EAS is – by far – currently the largest employer of welders in the region, especially in the shipbuilding industry, so its monopsonistic power (the wages of EAS welders is below that of welders in Rio de Janeiro shipbuilders\textsuperscript{15}) likely explains much of the shipyard’s willingness to generously invest in its employees’ general skills.

This market power will not last forever, given that two other shipyards are expected to locate in the Suape region. Therefore, in order to safeguard its human resources investments, it is important to EAS that it is able maintain a high rate of workforce retention. From the firm’s perspective, then, securing the loyalty of workers has crucial strategic significance for cutting down on costs associated with poaching externalities. EAS has put a number of measures which are targeted at both the level of the individual workers and that of the community as a whole, thus securing the loyalty of workers not only to the firm itself but also to the place within which the firm and its workers are situated.

In terms of individually targeted benefits, EAS workers receive a generous but unsurprising mix of perks, including medical and dental insurance, free bus transportation to and from work and access to career planning services, which provides information on opportunities for upward mobility. For example, the company has career ladders that allow workers who begin constructing piers can become surveyors or welders to become team leaders and, eventually, supervisors (Senai 2009a). These career ladders are folded into the company’s internal training system through the Centro de Treinamento. Further indicating EAS’ commitment to maintaining high job quality and, consequently, strong worker commitment and retention rates, the shipyard has also incorporated aspects of high performance work systems into its production operations. Chief among these is the Grupo de Melhoramento de Trabalho (Work Improvement Group), a group that represents EAS.

\textsuperscript{15} The median wage for welders in Brazil is US$8 (Boas 2007), while that of welders at EAS is around $6 (Camarotto 2010).
employees and enjoys an open-door policy with top management, thus allowing workers to exercise voice in shop-floor matters. Additionally, the company holds regular contests to see who can weld the greatest number of rolls of wire within a given amount of time. The “champion” receives new welding equipment, an LCD television set and a raise in salary of around R$50 per month. Thus, the firm makes an effort to honor the work contribution of its employees by attaching status and recognition to craftsmanship.

Beyond these benefits which are tied to the worker-employer link, EAS has made significant social investments in the community, effectively expanding the employment relationship beyond a simple economic transaction and towards a tighter social bond. In certain key respects EAS does not keep an arms-length distance with respect to its workers and their families; instead, through investments in local amenities, such as educational facilities and transportation infrastructure, it maintains a responsive and almost paternalistic affiliation with its employees and the community within which it is situated. For example, the shipyard has invested R$74 million in a housing development for its workers, which includes a bicycle path, an elementary school, childcare facilities and a health clinic (EAS 2010b). Other investments in local educational facilities, such as the Tatuoca Island school, further build links between the firm and the community within which it is embedded. As new employers enter the local labor market, then, it will be interesting to see the extent to which these social ties continue to facilitate worker retention, given the importance of retention to the maintenance of a strong internal training system.

Beyond these fairly concrete perks associated with employment at EAS, however, the shipyard has managed to instill loyalty among many of its workers simply due to the fact that it lifted them out of poverty. Indeed, most of the workers at EAS had been working in the informal sector as sugar cane harvesters, domestic servants or fishermen before seeking employment in the
shipbuilding industry. One worker – a bronze medalist in the welding championship – explained, “cutting cane, I worked more and earned less – some R$250 per fortnight. And now I have this health plan which is very good for my family” (quoted in Camarotto 2010). The opportunities offered to workers at EAS, not just in terms of salary and benefits, but also through education and training, have value to the workers. As one PROMINP coordinator put it, “they are grateful for the shipyard, the shipyard changed their lives. It’s not easy for another shipyard to go and say, ‘come work for me.’ No. ‘I used to work out in the sun cutting sugar cane, having a very tough life. I didn’t know how to read. And now I’m working here, I have this salary each month, I have this house now.’ So, it's a relationship with the local community” (Costa, personal interview). This “relationship” refers to the firm’s investments in the local education system and the local housing stock, as well as the transformative social force that the shipyard represents as an enormous, formal sector employer in a region formerly characterized by informal agricultural employment. While poaching remains a potential threat, then, EAS management assumes that the way that the firm has embedded itself within the local community as the provider of key sources of social status – housing, education, training, formal employment, pension and insurance benefits – could reduce worker retention issues by instilling loyalty. Angelo Bellelis, President of EAS, says of the shipyard’s workers that “they have an additional motivation, because it is their first job, the first in an industry. It’s that dream of building something different” (quoted in Senai 2009b)

That said, EAS is not quite a paradise. For example, so far two workers have died while working at the shipyard, indicating that core safety standards remain fairly weak. Indeed, the Sindicato dos Metalurgos de Pernambuco (Pernambuco Metalworkers Union), which is affiliated with the Central Única dos Trabalhadores (Central Workers Union) and represents workers at EAS has criticized the shipyard for negligence with regards to maintaining a safe work environment. In
addition, there was a strike in September, 2008, over what some workers believe is an unfairly low salary compared to the salaries of shipbuilding workers in other parts of the country.

To conclude, while the training programs described above proved sufficiently effective in producing a consistent flow of *skills* into EAS and the partnership with Samsung supplied *technological know-how*, the shipyard remained lacking in another form of human capital: *experience*. In the following section, I will explain how EAS recruited Brazilians from Japan and incorporated them as production workers and, crucially, trainers within the firm.

**Chapter VI: Embedding International Recruitment within the On-the-Job Training System**

Even as EAS managed to articulate a reliable training pathway across multiple programs to prepare new welders for its workforce, the company still ran up against the problem of limited access to welders with several years of experience. The question of experience is important not only because veteran workers are frequently used to train new hires. Experienced workers are also important for productivity because they tend to be better problem solvers and can complete tasks more quickly. Thus, it was in EAS’ interests to recruit experienced welders into its workforce. Given the historical lack of a local shipbuilding industry in the Northeast and, due to the uptick in demand induced by PROMINP, a scarcity of workers in other parts of the country, however, EAS had trouble identifying a large pool of skilled workers. Bringing in experienced production workers from Samsung’s shipyard in Korea was not an effective solution because of challenges posed by the language barrier. In the end, the company came upon an unlikely resource: skilled Japanese-Brazilians working in Japan.

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16 This was a much larger problem for EAS than for the shipyards in Rio de Janeiro, where most of the welders already had several years of work experience. A coordinator for PROMINP explained how the question of experience tied in with training issues: “But training people here [in Rio de Janeiro], it’s easier [than at EAS]. ‘OK, I need another 100 welders. I’ll contract 100, and they’ll be trained by my 1000 workers that I already have here.’”
In 1990, hindered by an aging workforce and a shortage of workers willing to do certain types of manual labor\(^{17}\), Japan reformed its migration laws in order to facilitate the immigration of workers to fill positions in factories and construction sites. The law targeted the descendents (up to the third generation) of Japanese emigrants in the interest of promoting cultural harmony. Given high rates of Japanese migration to Brazil during the early part of the 20\(^{th}\) Century\(^{18}\), Brazil was especially targeted as a source of unskilled and semi-skilled workers. By coincidence, the Brazilian economy in the early 1990’s was characterized by extreme hyperinflation, which made the relative macroeconomic stability of Japan (which was only just entering a prolonged period of very low economic growth) rather attractive. Additionally, wages in Japan were significantly higher than in Brazil, even for jobs that required little qualification. Consequently, large number of Japanese-Brazilian families responded to the call, and by 2010 an estimated 280,000 Brazilian nationals had moved to Japan, roughly 25,000 of whom also held Japanese citizenship (Gaspari 3/17/2010). These individuals were known as \textit{dekasegân} Japan or \textit{dekassegui} in Brazil\(^{19}\).

In recent years, however, global economic conditions shifted the pressures shaping workers’ decisions to migrate or not. Indeed, even though Brazil escaped the recession of 2007-2010 relatively unscathed, Japan faced contracting exports and rising unemployment. In fact, as a partial solution to the unemployment problem, the Japanese government instituted a pay-to-go program to incentivize non-Japanese citizens to return to their home countries by offering the equivalent of US$3,000 per adult and US$2,000 per dependent to families willing to leave the country and not seek re-entry within three years. Given that many \textit{dekassegui} workers, as non-citizens, were ineligible for the job

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\(^{17}\) These jobs, including many welding positions, are known in Japan as “3K” jobs because they are kitsui (difficult), kitanai (dirty) and kiken (dangerous).

\(^{18}\) São Paulo, for example, has the largest Japanese population of any city outside of Japan

\(^{19}\) \textit{出稼ぎ} (dekasegi) means “leaving to work.” It describes, from the Japanese perspective, the ethnically Japanese individuals who left Japan to work in Brazil (and other countries) early in the 20\(^{th}\) Century. It is therefore sometimes perceived as a pejorative term by the \textit{dekassegui} population that identifies itself as culturally Brazilian.
protection and unemployment benefits enjoyed by Japanese workers, the Japanese-Brazilian population in Japan was especially hard-hit by the recession. In addition, their opportunities for upward mobility were limited due to linguistic factors, discrimination, non-citizenship and other reasons. Consequently, for a number of dekassegui families – particularly those with unemployed workers – return to Brazil may have been an attractive option at the end of the first decade of the 2000’s.

Against this backdrop, four dekasseguis who returned from Japan sought employment at EAS in July, 2009. Given their experience as welders in Japan, the shipyard was willing to hire them. By November of the same year, the shipyard was in need of additional experienced welders to assist with training and to serve as team leaders. Recalling the four recently hired welders with experience in Japan, the Human Resources coordinator at EAS decided to attempt recruiting more dekasseguis. The company began advertising vacancies on the Portuguese-language television channel in Japan and placed recruiting ads on the internet20. In December, the Human Resources coordinator booked a plane ticket to Tokyo and spent ten days in Hamamatsu, a hub of Japanese heavy manufacturing and the home to one of the highest concentrations of dekasseguis in Japan. During this time, she interviewed candidates and made presentations about EAS and Pernambuco to dekassegui community groups. Interestingly, EAS’ recruitment efforts benefited from the unintended consequences of publicity provided through the Portuguese-language media in Japan once the shipyard initiated operations in 2009. One worker recalls the first time that he heard about EAS on the Portuguese-language television channel in Japan: “I saw on television that they were building the biggest shipyard in the Southern hemisphere here. Even [then-President] Lula was filmed.” (quoted in Estaleiro Atlântico Sul 2/9/2010). So, by the time that EAS began actively targeting workers for

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20 In this regard, EAS also benefitted from the positive coverage that it was receiving in the Brazilian media as operations were beginning in 2009.
recruitment from Japan, the existence of the company was already familiar to many of these individuals. Indeed, a spokesperson from the shipyard mentioned that in some cases welders from Japan themselves “[e]ntered into contact saying that there had been a lot of discussion in the Brazilian community in Japan about the construction of a large shipyard. In this sense, informal communication helped us out a lot” (quoted in Nippo-Brasil 2010c).

In February, 2010, fifty dekasseguis arrived in Ipojuca to begin work at EAS as welders. By March, the number had risen to 122, and the shipyard decided to attempt hiring a total of 200 dekasseguis in this capacity. The majority of the welders had received training in Japan and were certified by the Japanese Welding Engineering Society (JWES). Many had worked as welders in Japan, including in the shipbuilding industry, for several years – some for more than a decade. Therefore, they were experienced with the best practices of modern, fourth generation shipyards even as most Brazilian welders working in the Rio de Janeiro were working in the context of production technologies and management practices carried over from the 1980’s. Given that these workers were either Brazilian citizens or held dual Japanese-Brazilian citizenship, the repatriation process did not require that EAS go through the time-consuming process of securing work visas, which takes at least three months and sometimes as long as a year (Rocha 1/11/2011). The use of dekasseguis, then, is an even more flexible solution to the shipyard’s workforce issues than the recruitment of foreign workers without Brazilian citizenship.

Upon incorporation into the shipyards workforce, these dekasseguis were valuable to EAS not only as skilled welders. In many cases, they were also assigned to leadership positions within work teams. In this capacity, their main job was to do production tasks, but they had the additional job of training team members. For this additional work, they received a higher salary. The dekasseguis’ experience in Japan is beneficial to EAS not only for the high level of skills training that
it carries; they had become familiar with Japanese quality control practices. According to a spokesperson for EAS, “They brought an accumulated, functional knowledge. The profile of these workers fits perfectly with the level of welder that we were looking for” because of the discipline and knowledge of routine industrial practices that they brought with (Quoted in Nippo-Brasil 2010b). Dekassegui workers, then, in spite of their social and racial difference, were not relegated to the periphery of the firm but instead enjoyed important, central positions that conferred additional status and pay beyond what their less experienced co-workers earned. This central position within the organization of the firm allowed them to play a more significant role as facilitators of knowledge-transfer (Williams 2007). In spite of this, the dekassegus that were repatriated to work at EAS earned significantly less in pay than they could expect to have received in Japan. Of course, due to differentials in living costs, one can enjoy a higher quality of life in Northeastern Brazil on this lower wage than in urban Japan.

For some of the workers recruited by EAS, the lack of opportunities for upward mobility in Japan weighed heavily in their decision to return to Brazil. One welder explained, “My perspective is always looking hard for the top of the pyramid, and I couldn’t do this in Japan” (quoted in Folha de São Paulo 3/15/2010). A female EAS welder, the first woman to be certified in all categories by JWES, suggested she would never have had access to a position of leadership in a Japanese firm due to sexism. Remarking on her experience at EAS, however, “I was nervous about facing machismo [in Pernambuco] because I was coming to a place that I didn’t know, but then I saw that there wasn’t anything to worry about. I’m highly respected here. In this sense, Brazil is a hundred years ahead of Japan” (quoted in Nippo-Brasil 4/21/2010a). The return to Brazil, then, entailed an

21 One worker explained that he tried to impart to trainees cultural aspects of what he learned in Japan: “the work ethic is more important than the technique” (Estado de São Paulo 3/15/2010).
22 The median wage for shipbuilders in Japan is US$25 per hour, while in Brazil the figure is US$8 (Boas 2007). In Pernambuco, far from the hub of Brazilian shipbuilding in the relatively wealthy city of Rio de Janeiro, the median wage is around US$6 per hour (Camarotto 2010).
expansion of opportunities for occupational mobility and status attainment; leadership positions seem to have been closed in many cases to Brazilians working in Japan. Related to this, Brazilian workers in Japan had fewer rights to employment protection than Japanese workers and therefore faced less stable employment prospects, particularly within the context of the recession and the gradual decline of the Japanese shipbuilding industry over the last decade. Other workers explained that they decided to return to Brazil for more personal reasons and saw the opportunity to work at EAS as a means by which repatriation could be made feasible. For example, one worker decided to return to Brazil after the death of a parent (quoted in Estado de São Paulo 3/15/2010). Another believed that it was important that his children be raised in Brazil, claiming, “In spite of the high cost of living in Japan, we were able to live well. But I was worried about my children, with the quality of life that they would have, which made me return to Japan and bring them with me” (Quoted in Guibu 2010). Another worker echoed this sentiment, saying, “I earned good money there, but I thought about various factors. In Brazil, [my children] would be able to grow up better. Coming here was better for the whole family” (Quoted in Nippo-Brasil 2010). Importantly, the quality-of-life considerations that these workers incorporated into their migration decision-making included not only material satisfaction but also issues of the cultural identity of his family. The reasons for workers to repatriate, then, was generally not premised on the expectation of higher expected earnings but was crucially tied in with questions of social status, personal values and cultural identity.

This strategy of repatriating dekaseguis to work as skilled welders within the EAS organization is interesting for a number of reasons. First, it addresses the problem of dealing with an unskilled and inexperienced labor force by effectively facilitating human capital transfer within internal training systems while remaining responsive to the shipyard’s short-term labor needs. As described above, experienced workers repatriated from Japan were used not only in order to simply enhance the stock of skills commanded by EAS. They were also employed as team leaders and
trainers to actively impart skills and knowledge that they had attained in Japan through skills certification programs and years of work experience. Recalling that firms requiring human capital are traditionally thought to have the option to “make or buy” (Miles and Snow 1984), this case presents a hybrid solution. That is, the firm both recruits skilled workers from the outside (buying human capital) and strategically places these workers in central positions within work teams in order to facilitate skills transference to local workers (generating human capital). EAS’ experience demonstrates that linguistic considerations are an extremely important factor in the success of this sort of hybrid strategy for human capital formation. That is, the recruitment of Portuguese-speaking, Japanese-Brazilian workers allowed EAS to bypass the communication problems that otherwise derail such programs, as exemplified by company’s attempts to use Korean workers from Samsung. Dekasseguis, on the other hand, did not face this linguistic obstacle in transferring skills and knowledge to other welders because they were born in Brazil and share a common language with employees born in Pernambuco. Beyond these communication issues, the shared culture of They could therefore explain not only the technical aspects related to basic skill acquisition but also convey knowledge regarding the systematized routines of industrial employment, from management practices and technological processes that they had learned in Japan. The central position of these individuals within work teams, in turn, maximized the effectiveness of this knowledge transfer (Williams 2007). As one dekassegui worker at EAS mentioned, “Beyond just our training as welders, we brought from Japan knowledge about technology and a lot of life experience. Without all of this, I certainly wouldn’t be here” (quoted in Nippo-Brazil 2010b).

This strategy also presents a flexible solution to the problem of an inexperienced workforce within the context of an inadequate local pool of workers. Indeed, other routes to acquiring the skills required, such as direct training or foreign recruitment, would take months to yield results. As explained above, training locals frequently takes three months of remedial education and three
months of vocational training through Senai, in addition to months of on-the-job and laboratory-based, in-house training. Securing work visas for non-Brazilian citizens, on the other hand, requires between three months and one year to process at the Ministry of Labor and would therefore potentially take even longer than direct training. Work visa applications might be denied for welders, too, out of a concern that foreigners might “substitute” Brazilian workforce, driving down wages or “taking” Brazilians’ jobs (Fusco 1/11/2011). Given that the dekasseguis recruited by EAS were Brazilian citizens, however, they could be incorporated into the firm over a relatively short time-frame – much more quickly than would be permitted by either vocational training or foreigner recruitment.

Beyond that, the low retention rates usually associated with “footloose” immigrant workers was less of an issue for the dekasseguis given common cultural ties to the rest of the EAS workforce and management structure. Similarly (and somewhat ironically), unlike in Japan, repatriated dekasseguis had a sense that their work was honored and respected by the EAS through opportunities for leadership roles and for upward job mobility. Critically, then, the solution of recruiting dekasseguis served to satisfy a specific, short-term workforce need without creating the medium-term retention issues frequently associated with international recruitment as a result of short-term visa policies and lower levels of commitment to employers. The knowledge and skills commanded by these workers furthermore served to fill a gap (the lack of access to experienced mentors) in the internal training system of EAS, thus tying the firm’s recruitment strategy into the issue of firm-based human capital formation in a surprising and innovative way. As this case continues to develop into the future, however, it will be of interest to see the extent to which conflicts begin to emerge between increasingly skilled locally hired workers and internationally recruited team leaders over control of work teams, especially given the salary differential at stake.

It should finally be mentioned that this strategy may be emulated by other firms in the future as the Brazilian and Japanese governments, both separately and in partnership, begin to adopt
policies that facilitate the repatriation of dekasseguis. In the case of the Brazilian government, during the summer of 2010, the Ministry of Labor opened a facility in Hamamatsu, Japan (the same city where EAS’ Human Resources Coordinator went to recruit dekasseguis), called the Casa do Trabalhador Brasileiro (Brazilian Worker’s House). The facility was inaugurated during the Semana do Trabalhador Brasileiro (Brazilian Worker’s Week) in Japan, a series of events in commemoration of the 20th anniversary of the formal initiation of Brazil-Japan migration flows. The Casa do Trabalhador Brasileiro offers language courses (Japanese and Portuguese), legal assistance, cultural events and vocational training and qualification programs offered through Senai. Critically, it also provides job-matching assistance for Brazilians who might be interested in returning to Brazil. This initiative came about in part as a result of a 2008 Tripartite Dialogue on Migrations and Migration Policy, which convened representatives of labor unions, employer associations and government ministries and which recommended that CNIg focus resources for emigrants on those countries which are major receiving areas of Brazilian migrants. The Casa do Trabalhador Brasileiro in Hamamatsu was modeled off of an initial Casa do Trabalhador Brasileiro which was established in 2008 near the border with Paraguay and which provides similar services to Brazilian citizens in the area (CNIg 2010b).

In addition, as of 2009, CNIg has decided to begin tracking return migration to Brazil in an effort to craft better policies to support return migrants. The Council has been unable to reliably compile data on return migration, however, except in the case of return migrants from Japan. This is because of the tight monitoring of registered, foreign residents that the Japanese government has undertaken. In fact, CNIg has received data from its Japanese counterpart regarding the number of Brazilians that has returned from Japan (40,000 as of October, 2009, or slightly more than 10% of the total) as well as their destinations within Brazil (CNIg 2010a).
As for the Japanese government, the pay-to-go scheme has certainly incentivized the return of Brazilian nationals to their country of birth. In addition to this passive policy, that the Japanese Ministry of Foreign Affairs has at least expressed some interest in more active labor market policies. Indeed, the Japanese consul in Porto Alegre, Brazil, recently announced at a meeting of the Chamber of Commerce of Rio Grande the strong possibility that new shipyards in the Southern region of Brazil might benefit from the recruitment of dekasseguis, and declared the Japanese government’s interest in building closer and tighter relations with the region (Agora 2011). As the shipbuilding industry of Southern Brazil begins expanding with the support of PROMINP and PROMEF, it will remain to be seen if EAS’ strategy of recruiting dekassegui welders is emulated by other shipyards.

Chapter VII: Conclusions

The evidence presented above demonstrates how the EAS shipyard addressed the problem of a skills shortage by participating in the development of not only an internal training system but also in the consolidation of a regional network of vocational training institutions. This case, then, should be of interest to researchers and policy-makers who are interested in how processes of human capital formation are empirically played out at the local level in interaction with top-down pressures. The two main aspects of the firm’s strategy for ensuring a plentiful supply of skilled workers for its labor needs include (1) coordinated action with local actors and (2) a unique international recruitment policy. These two strategies were in turn facilitated by the ability of the firm to ensure high retention rates through securing employee loyalty and also by the responsiveness of the firm and other local actors to top-down opportunities that were presented by contemporary national- and global-level political and economic processes. In the conclusion, I will reiterate how
these themes manifested themselves within the case before attempting to draw out policy implications and methodological observations.

Stepping back for a moment, I wish to draw attention to three main conclusions that can be drawn from the EAS case before spelling out each point in greater detail below. First, the training institutions that emerged in the Suape Port Complex region both within EAS and through the Senai facilities were themselves situated between investments and actions from both above and below. This “sandwiching” of these institutions, I will explain, depended upon a specific sequencing of collective action and investment decisions between local- and national-level actors. Second, the firm’s attempts to secure the loyalty of its workforce serves to contribute to the consolidation of credible commitment and thus the minimization of poaching externalities which would otherwise threaten the firm’s continued support for local training institutes. Finally, I will explain how EAS’ use of international recruitment was an innovative solution to an operational barrier (the locally defined lack of experienced mentors) to internal workforce upgrading. Though on the surface the success of this recruitment strategy appears to be the result of happenstance, there are in fact valuable lessons to be learned.

Principally, this case addresses the methodological issue of how researchers and practitioners might conceptualize the situating of vocational training institutions within top-down and bottom-up pressures. Between 2005 and 2010, a new series of layered institutions linked to vocational training and education (schools, Senai facilities, and firm-based internal training systems) arose in the Suape Port Complex region to provide a vastly expanded supply of skills to the local labor market. The conditions under which these institutions, which enabled a private firm to profitably invest in training, were permitted to expand and survive, however, were themselves produced and reproduced not only through a series of outside investments touching down from above but also through commitments and instances of collective action which reached up from below.
Massive investments from national-level actors are, of course, critical to this story; this is not simply an example of local actors acting autonomously to solve local problems. We might first of all point to the fact that amplified industrialization and the accompanying demand for training institutions would not even exist were it not for national-level industrial policy targeting the petrochemicals and shipbuilding industries in the region. Beyond this, the social responsibility conditions attached to the BNDES loan to EAS and the $26 million real commitment on behalf of Senai’s national office in producing conditions both permitted – or at the very least provided incentive for – further investments in training at the local level on the part of municipal education departments and the firm itself. Similarly, it was shown that Petrobras and Sistema-S investments played an important role in enabling the creation of an effective leadership training curriculum within EAS.

The success of these top-down investments, however, is crucially premised on the agency of local-level actors to recognize opportunities from above and, either individually or through collective action, respond and embed them within the local network of already-existing vocational training and labor market institutions. For example, Sistema-S’ hugely expanded facilities could only achieve such impressive placement rates because EAS actively extended its own recruitment and internal training systems into the Senai school at Cabo de Santo Agostinho. Likewise, the contractually obligated social responsibility investments made by EAS in the local education system served as the basis for a sustained relationship between these two entities. Indeed, while the shipyard made a number of investments in constructing or renovating old schools and instituting curricula, local education departments subsequently took over the administration and financing of these facilities. From the firm’s perspective, this reciprocal relationship helped to develop the human capital base of the local labor market without entailing long-term and costly investments outside of its core competencies; as for local government actors, they could provide constituents with additional
educational resources without being required to make large capital investments. In this regard, the arrangement played to the organizational strengths of both parties. This case, then, should serve as a reminder to observers of institutional change that such processes are driven not only by macro-level political maneuvering but, to the extent that they have any sustained instrumental effect on the behavior of individual actors, are also embedded within pre-existing, community-level networks that span public, private and non-profit organizations.

The vocational training institutions in Suape, then, are themselves nested within guarantees of funding and operational support that have been supplied both from above and from below. To use the metaphor of a sandwich, the “meat” of the institutions must be held in place on both sides by the “bread” of top-down and bottom-up investments, market pressures and networks of supporting agencies. In this case, the bread could be said to be represented by: the (temporary) monopsony power of the firm; the loyalty of the workforce and its role in ensuring high retention rates; local-level partnerships between the firm, the Senai office and municipal education departments which create a network of mutual interests and contractual commitments; and, from above, market demand as well as financing from the public sector and from the national Senai office.

Moving beyond this generalized framework, however, it is clear that the effective sequencing of investments was important to the consolidation of effective training institutions in Suape. In this case, the firm was the first mover, in that it made initial capital investments in the local school system and announced a bold and costly program of internally provided vocational training. Partnership with the municipal schools helped the firm gain political capital locally which was later deployed once the firm and local municipal governments successfully lobbied the central Senai office to expand its Cabo de Santo Agostinho facility. In this case, then, EAS’ initial training investments were able to be leveraged by municipal governments and the firm into further support
from above. By the time that this improved facility came on-line, EAS was able to recruit partially trained graduates from the Senai welding program. Effectively, the firm simply folded the Senai training curriculum into its own training ladder. As a result, EAS was only responsible for three of the nine months of training expected of entry-level welders. Even though the majority of the financing for these training institutions came from above in the form of Senai’s direct investments and BNDES loans, both the initial training investments on the part of EAS and the firm’s ability to situate itself within local networks of government and non-profit actors were crucial to the consolidation of a training system that could benefit both worker and employer.

Understanding this dynamic between top-down and bottom-up processes is not just of theoretical interest, but it can also help policy makers to better conceptualize strategies for ensuring the provision of robust institutions that can minimize the threat of poaching externalities. From the top-down side, the EAS case demonstrates that outside investments from governments and private actors can indeed promote the consolidation of vocational training institutions at the local level, but that these investments should be premised upon the capacity of communities to absorb and embed these investments within networks of already-existing ties between local actors (in this case: EAS, the local Senai office and area schools). Thus, the policy debate over training should not be framed simply as a conflict between top-down and bottom-up strategies for organizing and funding vocational training institutions. Rather, policy-makers and academic observers should pay more attention to how pressures from above and below can be shaped, through planning and sequenced policy actions, in such a way that training institutions can be consolidated and sustained. Formulated in this way, the discussion can address the problem that many states face in leveraging national resources to reach goals which by their very nature must be achieved at the local level.

Beyond these financial and operational inputs which sustained the local training system, the literature also points out that credible commitment is a necessary condition for overcoming
poaching externalities and ensuring the sustained existence of these training institutions (Thelen 2004). Though monopsony power has been a critical factor in the firm’s ability to retain workers during the early years of EAS’ existence, worker loyalty has played and will increasingly play an important role in building commitment between workers and the firm. A number of sources of loyalty can be identified from the information presented above. For example, the firm has made direct investments in the skills of its workforce through vocational training, which the literature on workforce development indicates is an important strategy for building loyalty and minimizing turnover (Giloth 2000). Other individualized benefits provided to workers, such as formal employment, pensions, career services and above-median wages also help to develop loyalty, since the continued receipt of these benefits is linked to the employment contract. In addition, though, EAS has made a number of more diffuse, social investments that further undergird the loyalty and commitment of its workforce. Indeed, the firm’s investments in the housing stock, the local bus transportation network and the municipal education system have built, as the PROMINP coordinator put it, a “relationship with the community.” These actions serve not only to build up the loyalty of community members and workers to the firm but also to embed workers within their community, minimizing the threat that they might migrate outside the labor market. That is, EAS’ place-making investments in local amenities increase its workers’ satisfaction with the Suape region, so that they will be less inclined to relocate to higher-wage regions, such as the Southeast.

Sequencing is key here, as well. That is, monopsony power conferred by the shipyard’s first-mover advantage has allowed the firm to offer slightly below-market wages as it makes initial capital and operational investments, but it did so in a way that would help to embed workers within the community and within the firm’s career ladders.

Given the continued industrialization of the Suape region, loyalty will play an increasingly important role in maintaining a relationship of credible commitment between employer and worker.
While EAS’ current position as a lead firm in the region conferred monopsonist labor market power and thus allowed it to avoid some threats of poaching, the location of additional employers in the Suape region – including two new shipyards – will undermine this temporary advantage; a low-wage strategy cannot work in the long run. Loyalty, then, in addition to maintaining locally competitive wage rates, will become a key variable in determining EAS’ ability to retain its workforce and safely make continued investments in the transferable skills of its employees. This is because high retention, which effectively makes training investments “stickier” for firms, is essentially a “soft” signal of credible commitment between worker and firm. High retention is good for both workers and firms, then, because it can contribute to building a high-skill regional workforce (Giloth 2000). Therefore, planners and policy-makers working with local firms should do whatever they can to encourage firms to invest in the human capital and local amenities of their workforce. In the EAS case, this was accomplished at the national level through BNDES loan conditionality requiring social investments and through local government officials’ openness to coordinating with the shipyard on education strategy and lobbying efforts.

In spite of these successes in strategically sequencing and consolidating investments in training, however, there remained a basic operational barrier to EAS’ attempts to build a local workforce from scratch in Suape. Namely, the region lacked deep labor pools of skilled industrial workers which could be drawn upon as a source of trainers and mentors for the entry-level workforce. This was especially problematic because Brazil faces a generalized shortage of welders, such that it would be very costly to recruit workers from the Southeast. In fact, paying wages competitive with Southeastern employers would potentially create conflicts with the local workforce, because this would entail a very large wage differential between team leaders and entry-level workers. Here, the shipyard overcame this obstacle in an innovative way by recruiting and repatriating dekasseguis from Japan.
This recruitment strategy was successful for a handful of reasons. First, the ability of these leaders to communicate with their teams is, of course, crucial to transference of skills. Indeed, EAS’ initial attempts to use non-lusophone Korean workers were unsuccessful due to linguistic and cultural barriers to communication. Second, and related to this point, the work-team organization of labor within the shipyard allowed EAS to easily insert dekasseguis into its workforce as team leaders. In these leadership positions, recruited workers could effectively transmit the knowledge and tacit skills that they picked up in Japan to entry-level workers. Third, it is clear that publicity played a surprising and unintended role in EAS’ ability to access a labor force based in Japan. EAS’ decision to plug into this transnational labor market was reactive and opportunistic, as workers based in Japan who had learned about the shipyard on television initiated contact with the shipyard. By innovatively instituting a recruitment program, however, EAS successfully institutionalized and scaled up these transnational labor market linkages. This final point highlights that it is important for firms and policy-makers to look outside of value chains when seeking opportunities for process and workforce upgrading. Here, bilateral ties based on national identity, rather than inter-industry connections, formed the crucial link between the shipyard and dekassegui labor pools in Japan.

Finally, I will conclude by tying lessons from the EAS case into debates regarding active labor market policy and social policy implementation. For instance, observations regarding the external benefits of training in the EAS case speak to discussions regarding active labor market policies and the extent to which the state should support firm-based vocational training systems. As an example, in their evaluation of Brazilian active labor market policy, Barros et al (2006) claim that while training has a positive impact on labor productivity, “its impacts on job quality and matching are minor and indirect” on a general level. This view is consistent with the view that the state should promote decentralized governance and play a limited role in vocational training institutions (Canagarajah et al 2002, World Bank 1995). Given the evidence presented in this case study,
however, these positions should be reevaluated. The vocational training institutions, which were supported by state investments, meaningfully and directly produced positive effects on both of these outcomes. First, the existence of opportunities for upward mobility within the firm through training was clearly a determinant of job quality for workers. For example, the lack of opportunities for leadership training in Japan was an influential factor among some dekaseggui workers to repatriate to Brazil and take up employment at EAS. Second, the integration of training provided through Sistema-S with EAS internal training and career ladder strategies facilitated job matching for workers. In fact, it is unlikely that EAS would have managed to achieve such rapid speed to production were these integrated internal and external training systems not in place. When vocational training institutions are well integrated with firm strategies of workforce development, then, both job quality and job matching outcomes can be improved to the benefit of both worker and firm. As the EAS case demonstrates, the state can play a significant and positive role from above in ensuring the provision of well-performing training institutions.

On a slightly more theoretical level, this model of sandwiched training institutions could be helpful to policy circles interested in articulating the role of the state within new models of economic development and social policy. Proponents of the “social investment perspective” (Jenson 2011, Perkins et al 2004) as a counterweight to straightforward neoliberal policies of state minimalism, for example, emphasize the role of the state in assuring an optimal supply of human capital and other public goods. This policy perspective emphasizes the importance of links between the state and the community sector, whose role is to serve as “an organized expression of social needs and solidarity that requires public investments to build its capacity for partnerships” (ibid). The above discussion regarding the sandwiching of institutions of human capital formation within guarantees from above and below may serve to articulate one way in which these state-community links might be modeled.
Indeed, the EAS case demonstrates that embedding top-down investments within local networks of private and public actors was an important factor in making these investments stick.

In a similar vein, contemporary observers of economic development in Brazil have pointed out that, as opposed to the more interventionist import substitution policies of the past, the country has begun consolidating a strategy of “inclusionary state activism without statism” (Arbix and Martin 2009). Under this model of economic development policy, the state’s interventions in social and economic processes serve to create a friendlier environment for markets while at the same time actively ensuring that otherwise marginalized populations are enabled to partake in the gains of these newly enabled market forces. In the case presented in this paper, the state’s investments in the shipbuilding sector of the Suape Port Complex leveraged the private investments of EAS shareholders into creating thousands of skill-intensive jobs for workers previously relegated to the informal sector. The state’s approach, however, was not one of “command and control” but rather to selectively intervene in market processes in order to leverage and influence the investment decisions of local private and public actors. Again, then, the EAS case demonstrates that social and industrial policy which is well formulated and responsive to local-level actors can effectively channel national resources towards pursuing objectives which must be achieved sub-nationally.
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